

REMARKS

Applicant hereby responds to the non-final Office Action mailed on September 20, 2002. In response to the restriction requirement contained in the Office Action, Applicant hereby affirms the election (without traverse) of Group II (claim 20). Accordingly, Applicant notes that claims 1-19 and 21 have been withdrawn from further consideration by the Examiner. Applicant, however, expressly reserves the right to submit additional claims, as desired, throughout prosecution of this application.

Turning now to the substantive examination of the elected Group II, Claim 20 stands rejected under 35 U.S.C. § 112 (enablement requirement) and under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,280,875 (the "Kwak" reference). With respect to the §112 rejection, the Office Action states that in "steps (f) and (g) of claim 20, the first and second electrodes are formed by exposing a part of both the anode and cathode layers to external circuitry," wherein according to the specification and drawings, "it appears that the current collectors for both the anode and cathode layers are exposed to external circuitry." The Examiner correctly points out that it is not the anode and cathode layers *per se* that are exposed, but rather the leads. Accordingly, claim 20 has been amended to more accurately and clearly recite this limitation. In particular, (f) and (g) limitations now positively recite the anode and cathode leads, which directly correspond to the reference numerals 23 and 24 in Figure 5 and as described in the specification at page 11, first paragraph. For the sake of clarity, the first paragraph of page 11 of the specification has been amended to read "anode lead" and "cathode lead" to more accurately conform the reference numerals 23 and 24 in the specification with numerals 23 and 24 of Figure 5. The elements presented in (f) and (g) of claim 20, as amended, now recite an anode lead 23 and cathode lead 24, respectively. This amended specification does not present any new matter because the anode and cathode leads are described and illustrated in the application as filed.

With respect to the § 102(e) rejection, the Kwak reference is cited as a prior art reference. It is asserted that Figure 3 along with column 4, line 61, through column 7, line 7 of Kwak teach each of the elements a-g in claim 20. This rejection is respectfully traversed. However, in an effort to expedite prosecution, Claim 20 has been amended to more particularly recite the formation of the battery on a non-metallic substrate, such as glass or silicon. As such, reliance on Kwak as a § 102 reference is misplaced.

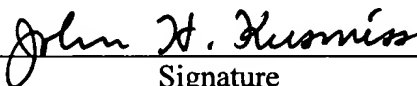
Kwak not only fails to teach each of the elements a-g in amended claim 20, but actually teaches away from the use of the non-metallic substrate recited in amended claim 20 and new claims 22-25. Indeed, Kwak is specifically titled "RECHARGEABLE BATTERY STRUCTURE WITH METAL SUBSTRATE" (emphasis added) and is directed exclusively to a battery structure utilizing metallic substrates. The metallic substrate is necessary in Kwak because the disclosed fabrication process involves high temperature annealing (e.g., 550° C to 900° C). Most non-metallic substrates of the present invention would generally melt at those temperatures. Kwak specifically teaches that "[v]arious metals or metal alloys combining two or more metals satisfying one or more of the above process parameters may be used to form the metallic substrate 22, such as, for example, zirconium (Zr) or titanium (Ti) whose melting temperatures are 1852° C. and 1668° C. respectively." Col. 5, lines 37-42. The present invention overcomes exactly the limitations found Kwak, i.e., formation of a battery structure with a non-metallic substrate utilizing a low-temperature annealing process. As such, Kwak does not teach the use of non-metallic substrates and is not an appropriate § 102 reference.

By entry of the foregoing amendments, and in light of the above remarks, Applicant sincerely believes that the present application is in condition for allowance.

Although no fee is believed to be required by this addition of new claims, the Office is authorized to deduct any fees required by this response (including any fees for additional claims or extensions of time) from Deposit Account No. 19-2814.

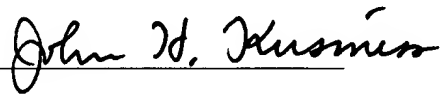
I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on December 5, 2002.

By:  John H. Kusmiss


Signature

Dated: December 5, 2002

Sincerely yours,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

The first full paragraph on page 11 has been amended as follows:

Following the above, the structure is sealed in a dry environment by placing a glass cover over it and attaching with epoxy. More specifically, the structure is placed in a dry environment (< 1% humidity) to cool after the preceding step of forming the anode layer 20. The active anode/electrolyte area is surrounded with a bead of 5 minute epoxy 21. Care is to be taken here to assure that the leads from the anode and current collector are not [full] fully enclosed by the epoxy bead. Next, a thin insulating protective layer 22 (such as glass) is placed over the active area such that a hermetic seal is created using the epoxy. The assembly is then allowed to dry. As can be seen in the plan view of Figure 5, anode lead 23 and a cathode lead 24 are exposed for connection to external circuitry. The result is the thin film batter in accordance with the present invention, which is shown in Figure 5.

IN THE CLAIMS

Claim 20 has been amended as follows:

20. (Amended) A thin-film battery structure comprising:

- a. an adhesion layer of cobalt deposited on a non-metallic substrate;
- b. a current collector layer of platinum deposited over said adhesion layer, wherein during the formation of said adhesion layer and said collector layer, said substrate is kept stationary;
- c. a cathode layer sputtered over said adhesion layer and current collector layer, which layer is formed of a thin-film solid state material, wherein during formation of said cathode layer said substrate is rocked back and forth so as to create an ovular area within which the cathode has desired characteristics, including nanocrystalline grains and proper crystallographic orientation on the substrate;
- d. a lithium based solid state electrolyte layer sputtered from over said cathode layer;

e. a lithium metal anode formed over said electrolyte layer by the use of an appropriate shadow mask;

f. [a first electrode formed by exposing a part of said anode layer for connection] an anode lead formed to connect anode layer to external circuitry;

g. [a second electrode formed by exposing a part of said cathode layer for connection] a cathode lead formed to connect cathode layer to external circuitry; and,

h. a package sealing and protecting said structure.

Please add newly drafted Claims 22-27:

22. (New) A thin-film battery structure comprising:

- a. an adhesion layer formed over a non-metallic substrate;
 - b. a current collector layer formed over said adhesion layer;
 - c. a cathode layer comprising a thin-film solid state material formed over said collector layer;
 - d. a lithium-based solid state electrolyte layer formed over said cathode layer;
 - e. a lithium metal anode formed over said electrolyte layer utilizing an appropriate mask;
 - f. an anode lead configured to connect said anode layer to external circuitry;
- and,
- g. a cathode lead configured to connect said cathode layer to external circuitry.

23. (New) The structure of claim 22, said substrate comprising one of glass and silicon.

24. (New) The structure of claim 22, further comprising an amorphous oxide layer formed on said substrate.

25. (New) The structure of claim 22, said adhesion layer comprising cobalt.

26. (New) The structure of claim 22, said current collector comprising platinum.

27. (New) The structure of claim 22, said mask comprising a photoresist base layer.

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